Pergamon

Economics of Education Review 21 (2002) 331–340

Economics of Education Review

www.elsevier.com/locate/econedurev

Intergenerational mobility, sibling inequality and borrowing constraints

Alejandro Gaviria *

Fedesarrollo, Calle 78, No. 9-91, Bogotá, Colombia

Received 28 January 2000; accepted 30 March 2001

Abstract

This paper studies differences in social mobility between rich and poor families. The paper shows that borrowing constraints retard social mobility among the poor by preventing poor parents from investing optimally in the their children's human capital. This evidence contradicts several recent studies that argue that innate ability is the overriding determinant of socioeconomic performance in the United States. The paper also shows that sibling inequality appears to be independent of parental wealth, which in turn contradicts the predictions of various economic models of resource allocation within the family.

JEL classification: J13; J62; J68

Keywords: Human capital; Educational finance

1. Introduction

If one were to summarize the main message of the massive scientific literature dealing with family influences, a single line would suffice: it pays to choose one's parents. This makes an obvious point: good parents are an unquestionable advantage in the quest for socioeconomic success. Less obvious is the question as to what parental characteristics have the greatest effect on children's outcomes. A short list would have to include parental wealth, family connections, parental teachings and genetic traits.

This paper studies the connection between parental wealth and children's earnings within the framework provided by Becker and Tomes (1986). These authors postulate an obvious mechanism through which parental wealth influences children's earnings. The crux of the argument is well known: if parents are not allowed to borrow against their children's earnings, poor parents will be unable to invest optimally in their children's human capital. This inability will in turn depress the earnings of poor children vis-à-vis rich children with the same ability and will retard social mobility among the poor.

I show in this paper that — as predicted by the Becker–Tomes model — earnings regress to the mean at slower rates for those families who lack enough funds to optimally invest in human capital. This finding is especially important in light of Mulligan's (1997) recent claims that borrowing constraints do not appear to be an important determinant of intergenerational mobility in the United States. I show that Mulligan's empirical results are not robust to small changes in his empirical strategy, thus casting serious doubts on his main findings and his policy recommendations.

If coupled with a few assumptions about parental preferences, the Becker–Tomes model also yields testable implications about the difference in sibling earnings inequality between rich and poor families. Wealthy parents in the model invest the wealth-maximizing amount of human capital in each child, which implies that human

* Tel.: +571-312-5300.

E-mail address: agaviria@fedesarrollo.org.co (A. Gaviria).

0272-7757/02/$ - see front matter
PII: S0272-7757(01)00031-0

capital investments will be disproportionally concentrated on the ablest of the children. While this will exacerbate earnings' differences among their children, no fairness issues will arise because wealthy parents can mitigate the differences in earned incomes with financial transfers. By contrast, poor parents in the model are unable to use transfers to alleviate earnings differentials, and hence they face a trade-off between equity and efficiency. It follows that if poor parents take into account equity considerations when deciding how much to invest in each of their children, the Becker–Tomes model implies that sibling earnings inequality will be on average smaller among poor families.

I test the aforementioned prediction of the Becker–Tomes model using two different data sets. I find no differences in sibling earnings inequality between rich and poor families. The causes of this alleged failure of the Becker–Tomes can be traced back to the specification of parental preferences. The different options that will render the model consistent with the intragenerational evidence are thoroughly discussed in the last section of the paper.

The organization of this paper is as follows. Section 2 sketches the Becker–Tomes model. Sections 3 and 4 present the empirical evidence concerning the intergenerational and intragenerational predictions of the model, respectively. Finally, Section 5 discusses the most salient aspects of the results.

2. The Becker–Tomes model

The Becker–Tomes model is the paradigmatic economic model of both the intergenerational transmission of inequality and the allocation of resources within the family. In the model, parents are assumed to be altruistic toward their children. Parents are also assumed to pass on endowments to their children at no cost. Endowments include cognitive ability, physical appearance, attitudes, family "connections", and in general all traits (both genetic and cultural) that affect children's earnings. In the simplest version of the model, all relevant endowments are summarized in a one-dimensional magnitude (E) that is transmitted from parents to children according to the following Markov process:

$$E_{t+1}=d+hE_t+v_t \tag{1}$$

where E_t and E_{t+1} are the endowments of parents and children respectively, v_t is the random component of the transmission process, and h represents the "inheritability" of endowments.

While by assumption parents cannot invest in their children's endowments, they can purposefully affect the incomes of their children by both investing in their children's human capital and transferring financial assets to them. Earnings and financial transfers from parents are the sole sources of income in the model. Consequently, the adult income of a representative child will be given by

$$I_{t+1}=H(x_t,E_{t+1})+(1+r_t)B_t, \tag{2}$$

where H are earnings (the returns to human capital), x_t are parental expenditures in human capital, B_t are financial transfers by parents, and r_t is the economywide rate of return of financial assets.[1] Barring financial constraints, parents will invest the wealth-maximizing level of human capital in each child.

Two different types of families can be distinguished in the model: non-capital-constrained families (or "rich" families) who invest the wealth-maximizing level of human capital and make financial transfers, and capital-constrained families (or "poor" families) who fall short of the optimal investments in human capital and do not make transfers.

2.1. Intergenerational transmission of earnings

As shown by Becker and Tomes (1986) and Mulligan (1997), the intergenerational transmission of earnings differs between "rich" and "poor" families. For "rich" families, earnings of parents and children are indirectly linked through the inheritability of endowments. In particular, earnings are transmitted across generations of "rich" families according to

$$\ln H_{t+1}=C+h\ln H_t+\varepsilon_t \tag{3}$$

where C is a complicated constant, ε_t is a first-order moving average process, and h is the degree of inheritability of endowments. For "poor" families, however, there is a direct connection between parental earnings and children's earnings. In particular, earnings are transmitted across generations of "poor" families according to

$$\ln H_{t+1}=C+(\beta+h)\ln H_t-\beta h\ln H_{t-1}+\varepsilon_t \tag{4}$$

where H_{t-1} are earnings of grandparents. A comparison of Eqs. (3) and (4) reveals that earnings regress to the mean at slower rates for "poor" families than for "rich" families. Assuming that there is no "market luck" (i.e., ε_t is white noise), the first-order autocorrelation coefficient implied by Eq. (4) is $(\beta+h)/(1+\beta h)$, while the coefficient implied by Eq. (3) is h. The former will be higher than the latter as long as $\beta>\beta h^2$, which will hold as long as the inheritability of endowments is less than perfect.

The excess of sensitivity of children's earnings to parental earnings in "poor" families can be interpreted as a measure of inequality of opportunity. If there was equal

[1] We will assume diminishing returns to human capital investments and higher returns for most able children.

access to education, all families would invest the efficient level of human capital, and earnings would regress to the mean at similar rates for both "rich" and "poor" families. Without equal access, family wealth matters and children from "rich" parents enjoy a clear advantage in their quest for socioeconomic success. Interestingly, a policy aimed at increasing access to education not only will reduce inequality of opportunity, but also will increase efficiency by ensuring that "poor" children will come closer to their optimal human capital levels.

The connection between family wealth and equality of opportunity (and hence the rationale for policies procuring equal access to education) is lost when borrowing constraints are absent. If there are not borrowing constraints, earnings are exclusively determined by endowments, and thus the intergenerational transmission of earnings is driven solely by the inheritability of endowments. These are precisely the main premises of the model of intergenerational mobility recently proposed by Herrnstein and Murray (1994) — adding perhaps the extra presumption that cognitive ability is the crucial endowment. In sharp contrast to the Becker–Tomes model, in Herrnstein and Murray's model any policy aimed at increasing equal access to education will be inconsequential on both efficiency and equity grounds.

2.2. Sibling inequality

If we add a few assumptions about parental preferences to the Becker–Tomes model, we can derive some interesting testable implications about differences in sibling inequality between rich and poor families. Parents are assumed to be averse to inequality in that, all else equal, they prefer a more egalitarian distribution of income among their children.[2] Parents are also assumed not to care about earning differentials among their children as long as they can be compensated with financial transfers. This precludes any parental concern about nonpecuniary effects of both earnings (they may enhance self-respect) and financial transfers (they may cause guilt or jealousy).

Consider first the implications of the previous assumptions pertaining to the inequality of earnings and income among children of rich parents. "Rich" parents (slightly redefined here as those that make financial transfers to all of their children) will invest the optimal amount of human capital in each child, which, given the assumption of higher marginal returns to human capital for better-endowed children, implies that human capital investments will be disproportionally concentrated on the ablest of the children. This choice will exacerbate earnings differences among children, but "rich" parents can avoid fairness concerns by using financial transfers to compensate differences in earned incomes. In sum, "rich" parents will both reinforce endowments differences and compensate the resulting earnings disparity by means of financial transfers.

Conversely, "poor" parents (redefined here as those that do not make assets transfers to any of their children) cannot alleviate earnings differentials via transfers and hence face a trade-off between equity and efficiency. Thus, "poor" parents face a dilemma of sorts. Should they reinforce endowments differentials by efficiently investing their scarce resources in their better-endowed children? Or, should they instead try to offset the vagaries of the endowment lottery by investing more in the unlucky children? Inequality-averse parents will opt for a compromise, meaning that they will sacrifice some efficiency to achieve some fairness. In sum, "poor" parents will not always reinforce their children's endowments differences, and so sibling's earnings inequality will be on average smaller among the "poor".

As recognized by Behrman, Pollak, and Taubman (1995), the Becker–Tomes model does not yield unambiguous predictions for "moderately rich" families (those that make financial transfers to some but not all of their children). This observation notwithstanding, the model still predicts a more egalitarian distribution of earnings among siblings for poor families regardless of whether or not they are defined to include "moderately rich" families. For example, if "rich" and "moderately rich" families are lumped together as a group (say, they cannot be distinguished in empirical work), the model will still predict higher earnings differentials among siblings for this group vis-à-vis "poor" families. A similar statement will apply if, alternatively, "moderately rich" families are lumped together with "poor" families. In sum, the Becker–Tomes model does predict a more egalitarian distribution of earnings among siblings for poor families — defined either inclusive or exclusive of "moderately rich" families.

3. Intergenerational relations

In this section, I estimate the rates of intergenerational earnings mobility for "poor" and "rich" families using a sample of fathers and children drawn from the PSID. The original Panel Study of Income Dynamics (PSID) sample was the result of the juxtaposition of two independent samples: the first was a nationally representative sample drawn by the Survey Research Center (SRC sample henceforth) and the second was a sample of low-income families drawn by the Bureau of the Census (SEO sample henceforth). Here I use both the SRC sample and the full PSID sample (SRC and SEO combined) to examine the robustness of the results to changes in the samples.

[2] Behrman, Pollak, and Taubman (1982) offer compelling evidence about the presence of parental aversion to inequality.

The procedure involves several steps. First, I link children to their "fathers" (original male household heads); then, I split the sample into "poor" and "rich" families according to a set of criteria that I shall explain below; and last, I estimate the following model for "rich" and "poor" households separately:

$$\ln H^i_{t+1} = \beta_1 + \beta_2 \ln H^i_t + \mathbf{X}^i_{t+1} + \varepsilon^i_{t+1}, \quad (5)$$

where H^i_{t+1} and H^i_t are earnings of the child and father respectively, $\mathbf{X}^i_{t+1}$ is a vector of covariates including the age of the child in 1986, the square of the age of the child and dummies for daughters and marital status. Earnings of a typical father were computed as the average of his annual labor income for the period 1968–72. Earnings of a typical child were computed in the same fashion for the period 1985–89. Both values were converted to 1984 dollars using the consumer price index.

A word of caution is necessary before moving ahead. I do not attempt in this paper to recover the structural parameters of Eqs. (3) and (4). Any attempt to do so will be complicated by both the lack of information on earnings for several generations and the fact that Eqs. (3) and (4) are difference equations with auto-correlated errors and hence no proper regressions (see Goldberger, 1989 for a discussion). My goal here is somewhat more modest: I use a mechanical model to uncover differences in the degree of intergenerational mobility between "rich" and "poor" families. While strictly speaking Eq. (5) is misspecified, it can still be used to gauge differences in earnings mobility between "rich" and "poor" families and to test the predictions of the model in this respect.[3]

There were three criteria for inclusion in the various samples used in the paper: (1) fathers must be members of the original PSID families and must have at least three available income entries in the period 1968–72, (2) children must be members of the original PSID families, must have at least three income entries in the period 1985–89 and must have left home by 1989, and (3) children must have been born some time between 1951 and 1961.

There were two criteria for inclusion in the "rich" families sub-sample: (1) children must have reported in 1989 that did receive, any time during the previous five years, inheritances of money or property worth $10,000 or more, or (2) children must have parents who reported a net worth over $100,000 in 1988.

Some comments about the latter criterion are in order. The reader should recall that "rich" families are defined here as those who invest optimally in their children's human capital. One can identify these families by looking at whether parents make financial transfers to their children in the form of either intervivos transfers or bequests. Because intervivos transfers in the PSID are negligible, I focus exclusively on bequests. This should explain criterion (1) above. Criterion (2) attempts to identify those families in which parents invested optimally in their children's human capital, despite not having reported financial transfers and not having left any bequests. The problem with criterion (2), however, is that parental wealth is not enough to determine whether parents invest efficiently in their children's human capital. If not altruistic enough, wealthy parents may fail to invest optimally in their children. Similarly, wealthy parents of very able children may be unable to invest the optimal level of human capital in each child (e.g., they just cannot afford to send the whole bunch to Harvard). These problems notwithstanding, one can argue that if parental wealth varies much more across families than parental altruism and children's endowments do, criterion (2) will not entail many misclassifications.

I estimate Eq. (5) for four different samples: the SRC sample for sons only and for sons and daughters, and the full PSID sample (SRC and SEO combined) for sons only and for sons and daughters. Table 1 reports summary statistics on age and income of fathers and children for "rich" and "poor" families. Lower mean earnings of children vis-à-vis fathers reflects life cycle effects; parents are observed in their 40s and children in their 30s. Higher earnings of SRC families reflect the oversampling of low-income families in the SEO sample.

Table 2 presents OLS estimates of the elasticity of children's earnings with respect to their father's earnings (β_2). The results are presented first for all families pooled together and then for "rich" and "poor" families separately. The estimates for the entire sample ("poor" and "rich" families combined) are just a restatement of Solon's (1992) results; namely, the degree of regression to the mean of earnings is about 40% for sons and about 30% for sons and daughters taken together. Estimated coefficients for "poor" families are greater than the same coefficients for "rich" families in each of the four samples. The difference between the two estimates is roughly ten percentage points and is very similar in all the samples but statistically significant only in the largest one.[4]

It is well known that OLS estimates will tend to underestimate the extent of intergenerational mobility because mean earnings over short periods of time are inexact measures of long-run earning potential (Solon, 1992; Zimmerman, 1992). It is unclear, however, whether this problem may also lead to an underestimation of the earn-

[3] See Han and Mulligan (1997) for a critique to this approach based on artificial simulations.

[4] I use the Satterwaite's approximation to compute the *p*-values used to test the difference between the estimated coefficients for rich and poor families (see, for example, Casella & Berger, 1990, p. 397).

Table 1
Sample characteristics[a]

	SRC		Full sample	
	Poor	Rich	Poor	Rich
Sons				
Mean father's age 1967	40.6	40.5	40.6	40.0
SD father's age	7.0	5.6	6.8	5.8
Mean father's earnings	22,970	36,394	19,591	34,234
SD father's earnings	13,357	23,069	11,507	21,882
Mean children's age 1986	29.0	29.2	28.8	29.1
SD children's age	3.2	3.2	3.1	3.1
Mean children's earnings	21,695	27,836	19,918	27,068
SD children's earnings	12,822	14,979	13,981	14,524
All children				
Mean father's age 1967	40.4	40.6	40.5	40.2
SD father's age	7.0	5.8	6.8	5.9
Mean father's arnings	23,646	36,732	19,583	34,796
SD father's earnings	13,616	23,864	11,597	22,826
Mean children's age 1986	28.7	29.2	28.8	29.2
SD children's age	3.2	3.2	3.1	3.1
Mean children's earnings	16,625	22,053	15,364	21,789
SD children's earnings	12,120	14,698	12,069	14,340

[a] Earnings are given in 1984 US$. Sample sizes are shown in Table 2.

Table 2
OLS estimates of intergenerational mobility of earnings[a]

Sample	*N*	All families	*N*	Poor families	*N*	Rich families	Difference
SRC — sons only	393	0.350	184	0.360	209	0.229	0.130
		(0.049)		(0.070)		(0.088)	[0.176]
Full sample — sons only	621	0.372	370	0.341	251	0.261	0.079
		(0.036)		(0.049)		(0.079)	[0.304]
SRC — all children	751	0.284	364	0.257	387	0.140	0.116
		(0.056)		(0.078)		(0.099)	[0.285]
Full sample — all children	1244	0.333	792	0.295	454	0.166	0.129
		(0.036)		(0.045)		(0.086)	[0.084]

[a] Standard-error estimates are in parentheses. *P*-values of a two-sample *t* test are in square brackets.

ings mobility gap between "rich" and "poor" families. To shed some light on this issue, I re-estimate Eq. (5) using father's education as an instrument to father's earnings. If father's education has an independent effect on children's earnings, the IV estimates will overestimate the extent of earnings mobility (Solon, 1992). This problem notwithstanding, the IV estimates provide yet another way to examine the rich-poor differential of earnings mobility.

Table 3 displays IV estimates of the degree of intergenerational mobility. As expected, the point estimates are consistently greater this time around. More importantly, the differences between "rich" and "poor" families are larger in this case: as large as 40 percentage points when the sample is restricted only to sons and greater than 20 percentage points on average.

We have focused so far on the differences in earnings mobility between "rich" and "poor" families. Earnings are the product of hours (labor supply) and wages (the returns to human capital). In theory, family wealth affects both hours (by altering children's incentives to work) and wages (by allowing optimal investments in children's human capital). While both effects are intrinsically interesting, this paper is mainly concerned with the latter. Fortunately, the PSID contains information about hours that can be used to compute wages and hence to examine differences in wage mobility between rich and poor families.

Table 3
IV estimates of intergenerational mobility of earnings[a]

	N	All families	*N*	Poor families	*N*	Rich families	Difference
SRC — sons only	384	0.428	181	0.491	203	0.215	0.276
		(0.075)		(0.112)		(0.183)	[0.075]
Full sample — sons only	601	0.559	358	0.646	243	0.253	0.392
		(0.058)		(0.090)		(0.169)	[0.006]
SRC — all children	736	0.519	359	0.498	377	0.421	0.078
		(0.095)		(0.148)		(0.210)	[0.708]
Full sample — all children	1209	0.592	769	0.623	440	0.513	0.110
		(0.058)		(0.086)		(0.178)	[0.442]

[a] Standard-error estimates are in parentheses. *P*-values of a two-sample *t* test are in square brackets. Father's education was used as an instrument to father's earnings.

Table 4
OLS estimates of intergenerational mobility of wages[a]

Sample	*N*	All families	*N*	Poor families	*N*	Rich families	Difference
SRC — sons only	364	0.334	172	0.369	192	0.229	0.140
		(0.043)		(0.061)		(0.072)	[0.097]
Full sample — sons only	559	0.343	330	0.365	229	0.219	0.146
		(0.036)		(0.049)		(0.066)	[0.057]
SRC — all children	629	0.312	300	0.364	329	0.157	0.207
		(0.036)		(0.051)		(0.058)	[0.003]
Full sample — all children	1029	0.364	646	0.402	383	0.135	0.267
		(0.028)		(0.037)		(0.053)	[<0.001]

[a] Notes: Standard-error estimates are in parentheses. *P*-values of a two-sample *t* test are in square brackets.

While theoretically the case for using wages (instead of earnings) is indisputable, empirically it is not. In the PSID, annual earnings are observed with much more precision than hourly wages (see Hill, 1992 for interesting analysis of this point).[5] The trade-off is clear: if one believes that the labor supply is not greatly affected by parental wealth and that measurement error is especially troublesome, one should use earnings. Otherwise, one should use wages. Here I follow an eclectic approach and present results for both earnings and wages.

Table 4 repeats the analysis of Table 2 using hourly wages. The results point to the presence of substantial differences in wage mobility between rich and poor families. Differences are always significant at the 10% level and are significant at the 1% level in three of the four samples analyzed (the differences are somewhat smaller when the sample is restricted to sons only). On the whole, these results confirm the previous findings to the effect that intergenerational mobility is lower among poor families.

The results of Tables 2 to 4 stand in sharp contrast to a similar set of results reported by Mulligan (1997). Using the same data set and a similar empirical strategy, Mulligan does not find consistent differences in earnings mobility between "rich" and "poor" families.[6] For him, the practical implications of his findings are immediate; "rather than reducing inequality, government subsidization of schooling may only have the effect of transferring resources from taxpayers to (a) educators and (b) richer families who are more likely to choose many years of schooling for their children." This is, of course, a familiar point in Herrnstein and Murray (1994); namely, the futility of a policy aimed at removing financial barriers to educational attainment and, in general, of any government policy aimed at increasing fairness.

Why are Mulligan's results different from the results of this paper? The answer has to do with the criteria used

[5] The ratio of error-to-total variance for hourly wages in the PSID oscillates between 0.67 and 0.69 (Hill, 1992, p. 29).

[6] In addition, Mulligan does not find any consistent differences between "rich" and "poor" families in the intergenerational transmission of consumption. It is difficult, however, to interpret this finding because the predictions of the Becker–Tomes model in this respect hinge heavily on auxiliary assumptions concerning assortative mating and fertility (Becker, 1991, pp. 259–261).

by Mulligan to split the sample into "rich" and "poor" families. Mulligan uses actual and expected inheritances as reported by adult children in the 1984 round of the PSID. I see at least four problems with Mulligan's split. First, it is impossible in the PSID to know whether actual (or expected) inheritances came (or will come) from the children's parents.[7] Second, it is also impossible in the PSID to determine whether inheritances come from the husband's or the wife's side. Third, expected inheritances in the PSID are strikingly inconsistent with actual inheritances, at least for those who received inheritances after 1984.[8] And last, Mulligan's splitting criteria produce a subsample of "rich" families too small as to permit reliable comparisons of earnings and wage mobility between "rich" and "poor" families.

Appendix A sheds more light on the sources of the difference between Mulligan's results and the results of this paper. The Appendix presents estimates of earnings mobility for "rich" and "poor" families using Mulligan's splitting criterion. This exercise replicates the most important results of Mulligan's analysis: first, no consistent differences in intergenerational mobility between "rich" and "poor" families are apparent, and second, the differences are sensitive to sample restrictions. These results clearly indicate that the differences in the criteria used to split the sample into "rich" and "poor" families are the main factor underlying the differences between Mulligan's results and the results of this paper.[9]

Alternative evidence highlighting the importance of family wealth in general and borrowing constraints in particular abounds.[10] Tomes (1981) and Mulligan (1997) provide an alternative way to test the predictions of the Becker–Tomes model. Instead of looking at intergenerational mobility, they directly estimate the parental demand for schooling. They find that — as predicted by the model — schooling is much more sensitive to family income in "poor" families than in "rich" families. Similarly, Behrman, Pollak, and Taubman (1989) use a sample of World War II veterans to assess the effects of the so-called GI Bill. Their results strongly indicate that "unequal access to financing for college education is an important source of differences in educational attainment" between rich and poor families. According to their estimates, unequal access to education may explain as much as 20% of the observed income inequality in the United States. In the same vein, Featherman and Hauser (1976) show that the connection between years of schooling and family background have declined substantially during the last few decades. This evidence — coupled with the dramatic increase of public expenditures in education during the same period — suggests that borrowing constraints have played a fundamental role in the transmission of inequality between generations in the United States.

There have been, on the other hand, several studies showing that in the United States (and in other developed countries as well) upward mobility at the bottom of the distribution is higher than downward mobility at the top.[11] Although there is a superficial connection between these studies and this paper (they all deal with non-linearities in the transmission of socioeconomic status), they are fundamentally different. While this paper is mainly concerned with testing differences in mobility between capital constrained and non-capital constrained families, the other papers are mainly concerned with differences in mobility among income groups. Because the mapping from the sample "splits" proposed in the paper into the income groups proposed elsewhere is unclear, little can be said about whether or not the two sets of results contradict each other.

4. Sibling inequality

In this section, I study the connection between sibling earnings inequality and family wealth. The main goal of this section is to test the prediction of the Becker–Tomes model of greater sibling earnings inequality among "rich" families.

The same sample selection criteria mentioned above were used in this section with two important exceptions. First, families with only one child were excluded for obvious reasons. Second, "rich" children now also include those children that did not receive inheritances themselves but that have a sibling who reported receiving an inheritance over 25,000 dollars. In other words, the sample of "rich" families also include here "moder-

[7] Mulligan (1997, p. 228) cites evidence from a different survey showing that 78% of inheritances come from parents or grandparents.

[8] PSID members were asked in 1984 about future inheritances. Then they were asked in 1989 if they received any inheritance during the previous five years. This information permits a preliminary evaluation of the accuracy of people's perceptions about future inheritances. The correlation coefficient between expected and actual inheritances in the PSID is either −0.05 or 0.08 depending on whether or not inheritances smaller than $25.000 are considered in the calculation.

[9] I use a different set of instruments and a slightly different set of control variables than Mulligan did. This can explain the small differences between my results and his.

[10] Mulligan (1997) presents a comprehensive summary of this evidence.

[11] See, for example, the evidence reported by Zimmerman (1992) and Solon (1992) and Solon (1992) for the United Sates, by Corak and Heisz (1995) for Canada, and by Atkinson, Maynard, and Trinder (1983) for the United Kingdom.

Table 5
Average of coefficient of variation across families (PSID)[a]

	All children			Brothers		
	Number of families	Earnings	Schooling	Number of families	Earnings	Schooling
All families	592	0.511	0.094	232	0.381	0.091
		(0.314)	(0.075)		(0.276)	(0.080)
Poor families	440	0.513	0.096	158	0.384	0.095
		(0.315)	(0.077)		(0.275)	(0.082)
Rich families	152	0.505	0.0863	74	0.373	0.083
		(0.312)	(0.066)		(0.278)	(0.074)

[a] Only families with two or more children were used. Standard deviations in parentheses.

ately rich" families in the sense defined above and formerly introduced by Behrman et al. (1995).[12]

Table 5 displays the average across families of the coefficient of variation of sibling earnings (A_v). The expression used in the computation is as follows

$$A_v=\sum_{f=1}^{F}\frac{\sqrt{\sum_{s=1}^{S_f}(H_{sf}-\bar{H}_f)^2/(S_f-1)}}{\bar{H}_f}\Big/F \quad (6)$$

where F is the number of families in the relevant sample, S_f is the number of siblings in family f, H_{sf} are the earnings of sibling s in family f (defined exactly as in the previous section), and $\bar{H}_f$ are the average earnings of the S_f siblings in family f.

The results are shown for all families pooled together and for "rich" and "poor" families separately. Inequality of earnings within families is almost identical in the three samples. The same result holds if one restricts the analysis to brothers only: the inequality is obviously lower but the differences across the three samples are again very small. Similar results were obtained using different measures of inequality (i.e., the Gini coefficient and the standard deviation of log earnings), and using the residuals of a regression of earnings on several personal characteristics (i.e., age, age squared and a dummy for marital status). Clearly, these results lend little support to the theoretical prediction of greater earnings inequality among siblings for "rich" families.

Given the previous assumption of higher marginal returns to better-endowed children, the Becker–Tomes model also predicts that sibling inequality of schooling should be greater for "rich" families than for "poor" families. Table 5 also shows that sibling inequality of schooling is greater for "poor" families. As before, the same result obtains irrespective of the measure of inequality and irrespective of whether or not schooling is orthogonalized with respect to some personal characteristics.

I use a sample of adult children drawn from the Health and Retirement Study (HRS) to reevaluate the predictions of the model concerning intrafamily differences in earnings and schooling. The HRS begun in 1992 with a random sample of 13,500 individuals distributed in 8000 households. The survey focuses mainly on individuals making the crucial transition from work to retirement. There are two features of the HRS that are especially important for the purposes of this paper. First, individuals were asked about the likelihood of leaving inheritances to their children (note the contrast with the PSID where people were asked about the likelihood of *receiving* future inheritances). Second, respondents who have living children provide fairly detailed information for each child, including schooling and income.

There were two criteria for inclusion in the sample: (1) respondents must have at least two adult children, and (2) children must be at least 24 years old and out of school. On the other hand, children were assigned to the "rich-families" sub-sample only if their parents report almost absolute certainty that they will leave a sizable inheritance. Because it is unknown whether or not all children will be named heirs, this classification is similar to the one used above to identify the set of "rich" and "moderately rich" families in the PSID.

Table 6 reproduces the results of Table 5 for the HRS samples. Income was computed here on the basis of three income brackets reported by their parents, which should explain the smaller absolute values in comparison to the corresponding values for the PSID. Once again, sibling income inequality appears to be slightly greater among "poor" families. The same is true for schooling inequality. Again, these results cast some doubts upon the predictions of the Becker–Tomes model of greater earnings (and schooling) inequality among relatively more affluent siblings.

[12] Specifically, "moderately rich" families are those in which at least one but not all of the children receive significant financial transfers from their parents (see the discussion in Section 2).

Table 6
Average of coefficient of variation across families (HRS)[a]

	All children			Brothers		
	Number of families	Income	Schooling	Number of families	Income	Schooling
All families	3541	0.276	0.088	1728	0.246	0.082
		(0.240)	(0.086)		(0.257)	(0.092)
Poor families	2557	0.289	0.091	1280	0.255	0.086
		(0.240)	(0.087)		(0.259)	(0.094)
Rich families	939	0.237	0.082	421	0.221	0.072
		(0.238)	(0.082)		(0.251)	(0.084)

[a] Only families with two or more children were used. Standard deviations in parentheses.

5. Discussion

The empirical results of the previous two sections suggest that whereas the predictions of the Becker–Tomes model concerning intergenerational relations seem to be borne out by the data, the predictions concerning intragenerational relations do not. How to explain this? A natural way to reconcile the model with the evidence is by changing some of the extra assumptions introduced earlier to study resource allocation within the family. One may drop the assumption of parental aversion to inequality. Alternatively, one may argue — as in Behrman et al. (1982) — that children's earnings and financial transfers enter the parental utility function separately or even argue that parental aversion to inequality increases with family wealth. Any of these options can render the model capable of explaining both the intergenerational and the intragenerational evidence.

Also, one may assume that the differences in endowments as perceived by parents do not have much bearing on their marginal decisions concerning human capital investments (i.e., whether or not to send a child to college). For example, parents may be reluctant to pass judgment on their children's abilities. Or, similarly, they may perceive high returns to additional human capital investments irrespective of ability. Once again, these new assumptions will reverse the intragenerational predictions of the Becker–Tomes model and may well account for the failure of the Becker–Tomes model in this respect.

Thus, there are many different stories that can explain the intragenerational evidence presented above, which points to a more fundamental problem of the economic analysis of resource allocation within the family; namely, many theoretical propositions about intragenerational relations hinge heavily on ad hoc assumptions about parental preferences and attitudes.[13] Intergenerational propositions, on the other hand, are much more robust to assumptions about parental preferences and attitudes, hence definitive interpretations of the evidence are more likely in this case. All in all, I believe that the intergenerational evidence of this paper strongly suggests the importance of borrowing constraints in the transmission of inequality in the United States.

Needless to say, the positive connection between parental wealth and social mobility uncovered above merits more research. On the one hand, the policy applications and social repercussions are wide-ranging; on the other, much uncertainty about the size of the effects as well as the mechanisms of transmission of inequality is still present.

Acknowledgements

Gary Becker, Momi Dahan, Casey Mulligan, Valery Ramey, Steven Raphael, Joel Watson and two anonymous referees provided helpful suggestions. The Alfred P. Sloan Foundation provided generous financial support in the form of a dissertation fellowship.

Appendix A. Mobility differences between rich and poor families using Mulligan's splitting criterion

Tables 7 and 8

[13] The economic analysis of the family has been recently criticized by E.O. Wilson (1998) on the grounds that it offers little more than folk psychology in the guise of economic language. In Wilson's words, "typically the predictions arise from the commonsense intuition of the modeler, that is, from folk psychology, and following a series of analytical steps, confirm commonsense beliefs."

Table 7
OLS estimates of intergenerational mobility of wages[a]

Sample	*N*	All families	*N*	Poor families	*N*	Rich families	Difference
SRC — sons only	364	0.334	320	0.331	42	0.361	−0.030
		(0.043)		(0.045)		(0.191)	[0.687]
Full sample — sons only	559	0.343	494	0.334	62	0.455	−0.121
		(0.036)		(0.037)		(0.144)	[0.278]
SRC — all children	629	0.312	556	0.312	70	0.316	−0.005
		(0.036)		(0.037)		(0.132)	[0.966]
Full sample — all children	1029	0.364	912	0.359	113	0.423	−0.065
		(0.028)		(0.029)		(0.098)	[0.458]

[a] Standard-error estimates are in parentheses. *P*-values of a two-sample *t* test are in square brackets.

Table 8
IV estimates of intergenerational mobility of wages[a]

	N	All families	*N*	Poor families	*N*	Rich families	Difference
SRC — sons only	355	0.426	313	0.429	39	0.407	0.022
		(0.077)		(0.081)		(0.336)	(0.926)
Full sample — sons only	541	0.526	479	0.529	59	0.602	−0.074
		(0.062)		(0.064)		(0.262)	(0.704)
SRC — all children	615	0.540	546	0.541	66	0.594	−0.052
		(0.069)		(0.072)		(0.303)	(0.812)
Full sample — all children	998	0.613	886	0.615	108	0.674	−0.060
		(0.049)		(0.051)		(0.186)	(0.699)

[a] Standard-error estimates are in parentheses. *P*-values of a two-sample *t* test are in square brackets.

References

Atkinson, A., Maynard, B. K., & Trinder, C. G. (1983). *Parents and children: incomes in two generations.* London: Heinemann.

Becker, G. S. (1991). *A treatise on the family.* Cambridge, MA: Harvard University Press.

Becker, G. S., & Tomes, N. (1986). Human capital and the rise and fall of families. *Journal of Labor Economics*, *4*(3), S1–S39. (Reprinted in Becker, G. S. (1991) *A treatise on the family* (pp. 238–276). Cambridge, MA: Harvard University Press.)

Behrman, J. R., Pollak, R. A., & Taubman, P. (1982). Parental preferences and provisions for progeny. *Journal of Political Economy*, *90* (1), 52–73.

Behrman, J. R., Pollak, R. A., & Taubman, P. (1989). Family resources, family size, and access to financing college education. *Journal of Political Economy*, *97* (2), 398–419.

Behrman, J. R., Pollak, R. A., & Taubman, P. (1995). The wealth model: efficiency and distribution in the family. In J. R. Behrman, R. A. Pollak, & P. Taubman, *From parent to child* (pp. 113–138). Chicago: University of Chicago Press.

Casella, G., & Berger, R. (1990). *Statistical inference.* Belmont, CA: Duxbury Press.

Corak, M., & Heisz A. (1995). The Intergenerational income mobility of Canadian men. *StatCan Working paper* No. 89.

Featherman, D., & Hauser, R. (1976). Changes in the economic stratification of the races. *American Journal of Sociology*, *82* (3), 621–651.

Goldberger, A. (1989). Economic and mechanical models of intergenerational transmission. *American Economic Review*, *79* (3), 504–513.

Han, S., & Mulligan, C. B. (1997). Human capital, heterogeneity, and the estimation of degrees of intergenerational mobility. *Discussion paper* No. 97-3. University of Chicago Population Research Center.

Herrnstein, R. J., & Murray, C. (1994). *The bell curve: intelligence and class structure in American life.* New York: The Free Press.

Hill, M. (1992). *The panel study of economic dynamics: a user's guide.* Newbury Park, CA: Sage Publications.

Mulligan, C. B. (1997). *Parental priorities and economic inequality.* Chicago: University of Chicago Press.

Solon, G. (1992). Intergenerational income mobility in the United States. *American Economic Review*, *82* (3), 393–408.

Tomes, N. (1981). The family inheritance, and the intergenerational transmission of inequality. *Journal of Political Economy*, *89* (5), 928–958.

Wilson, E. O. (1998). *Consilience: unity of knowledge.* New York: Knopf.

Zimmerman, D. J. (1992). Regression toward mediocrity in economic stature. *American Economic Review*, *82* (3), 409–429.